

WHAT IS CLAIMED IS:

1. A method of providing corrosion protection for a metal by coating it with an alkanethiol, comprising the steps of

5 a. dissolving or dispersing said alkanethiol in a solvent and preparing a solution or dispersion,

b. treating said metal with said solution or dispersion,

c. drying or curing the treated metal, and

thereby increasing the corrosion resistance of said metal without using chrome.

10 2. A process according to Claim 1 wherein said alkanethiol has the general formula, $R(CH_2)_nSH$, where R is selected from methyl, carboxyl, hydroxyl, formyl, amide, and n is in the range of 7 to 21, preferably in the range of 12 to 18.

15 3. A process according to Claim 1 wherein said alkanethiol is 1-octadecanethiol.

20 4. A process according to Claim 1 wherein said metal is selected from but not limited to hot rolled and pickled steel sheet, cold-rolled steel sheet, stainless steel sheet, hot-dipped metallic coated steel sheets, electroplated metallic coated steel sheets, aluminum sheets and aluminum alloy sheets, zinc sheets, zinc alloy sheets, copper sheets, copper alloy sheets, gold, and silver.

25 5. A process according to Claim 1 wherein said metal is selected from but not limited to coatings of one or more layers of lead, lead alloy, nickel, nickel alloy, zinc, zinc layer, tin, tin alloy, and the like.

30 6. A process according to Claim 1 wherein said metal is galvanized, electro-galvanized, phosphated, resin-coated, or combinations thereof prior to coating alkanethiol.

7. A process according to Claim 1 wherein said solvent is selected from alcohols, glycols, acetone, toluene, ethyl acetate, hexane, furan, tetrahydrofuran (THF),

methylene chloride, ethers, formic acid, formamide, N,N-dimethyl formamide, acetonitrile, alkanes, turpentine, benzene, ethyl or butyl acetate, petroleum ester, xylene, carbon tetrachloride, mineral spirits, and water; or combinations thereof.

5 8. A process according to Claim 7 wherein a preferred solvent is selected from ethanol, 1-propanol, 1-butanol, and mixtures thereof.

9. A process according to Claim 1 wherein the concentration of said alkanethiol is in the range of 1 to 500 millimoles per liter, preferably in the range of 20
10 to 50 millimoles per liter.

10. A process according to Claim 1 wherein said metal substrate is coated with said solution or dispersion by using a means selected from immersion, spray, painting, roll coating, and flow coating.

15 11. A process according to Claim 1, wherein said metal is coated with said solution or dispersion by immersion.

12. A process according to Claim 11 wherein said metal is immersed in said
20 solution or dispersion for a period ranging from 3 seconds to 15 minutes, preferably from 5 seconds to 5 minutes for the case of cold-rolled steel sheets.

13. A method of providing corrosion protection for a galvanized steel by coating it with an alkanethiol, comprising the steps of

25 d. dissolving or dispersing said alkanethiol in a solvent and preparing a solution or dispersion,

 e. treating said galvanized steel with said solution or dispersion,

 f. drying or curing the treated galvanized steel, and

 thereby increasing the corrosion resistance of said galvanized steel without
30 using chrome.

14. A process according to Claim 13 wherein said galvanized steel is electro-galvanized.

15. A method of providing corrosion protection for a galvanized steel by coating it with a mercaptosilane, comprising the steps of

g. dissolving or dispersing said mercaptosilane in a solvent and preparing a solution,

h. treating said galvanized steel with said solution,

i. drying or curing the treated galvanized steel, and

thereby increasing the corrosion resistance of said galvanized steel without using chrome.

16. A process according to Claim 15 wherein said mercaptosilane has a general formula, $\text{HS}(\text{CH}_2)_n\text{SiR}_1\text{R}_2\text{R}_3$, where R_1 , R_2 , R_3 are independently selected from the groups comprising alkoxy groups, alkyl groups, hydrogen and hydroxyl; and wherein n is an integer from 2 to 10.

17. A method of coating galvanized and phosphated steel with an alkanethiol with terminal methyl group to increase the hydrophobicity of the treated surface, so that the steel becomes fingerprint free without coating it with a polymeric resin.